

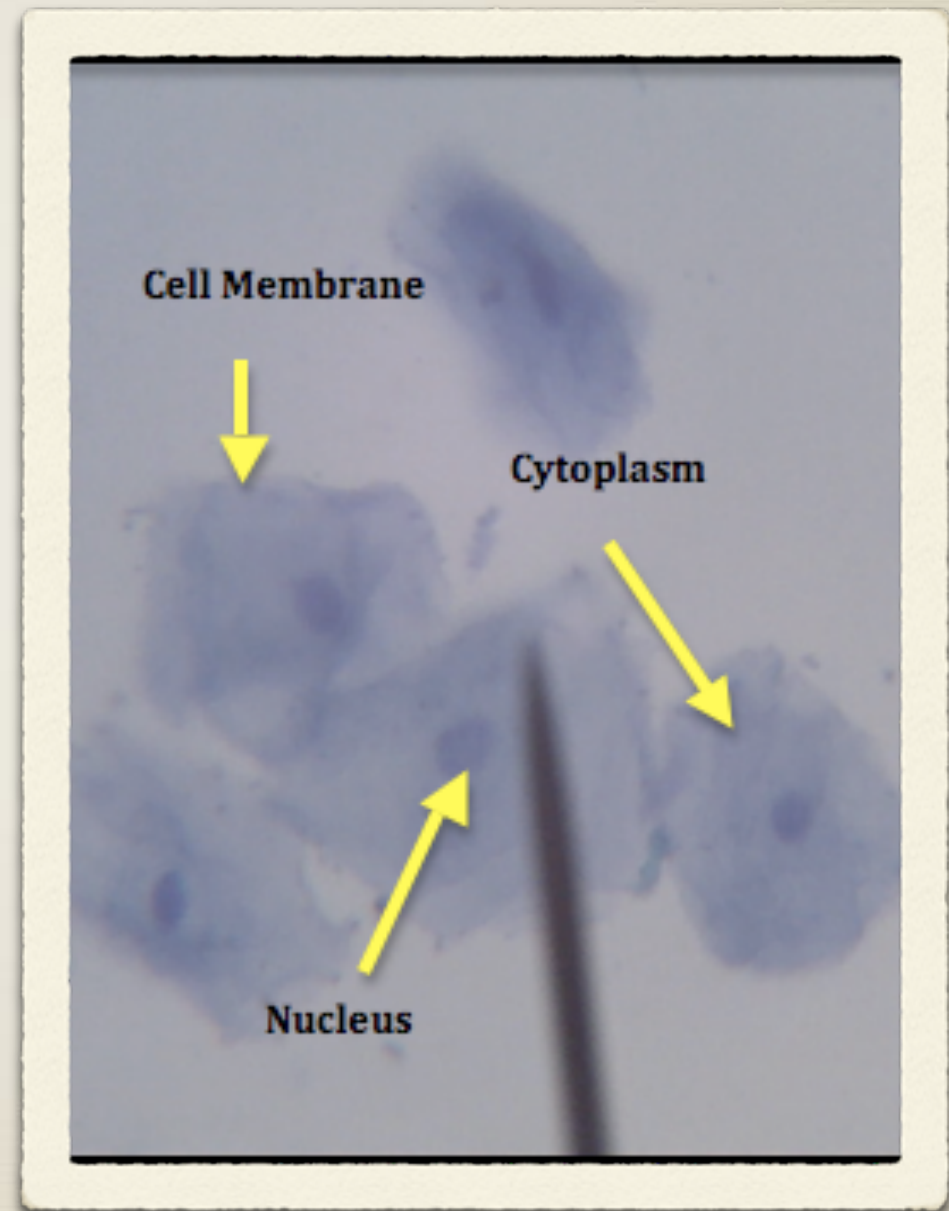


Looking Inside Cells

A Journey Within

Looking Inside the Cell

Cells make up the structure and function of all living things. There are smaller structures inside a cell that allows a cell to do this. These tiny cell structures, called organelles, carry out specific functions within the cell.



Enter the Cell

Plant Cell Wall

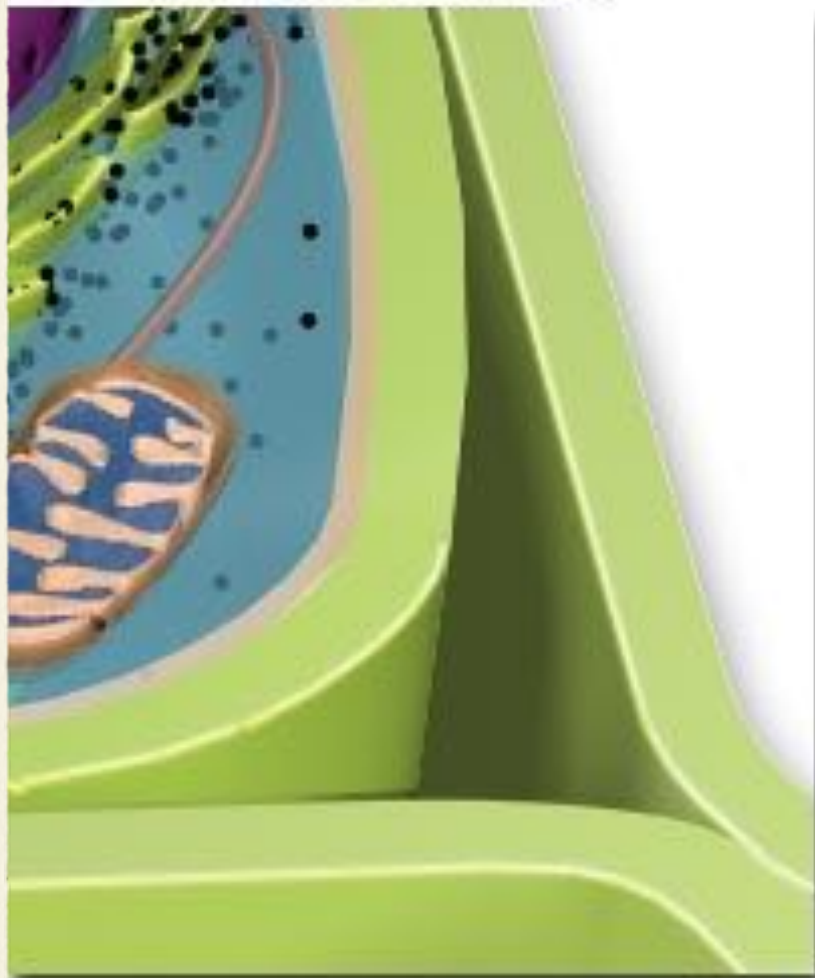


Figure 1

The **cell wall** is a rigid layer of nonliving material that surrounds the cells of plants and some other organisms.

A plants cell wall helps to protect and support the cell. The cell wall is made of a strong, flexible material called cellulose, and many materials can pass through it.

In cells that do not have cell walls, the **cell membrane** is the outside boundary that separates the cell from its environment. All cells have cell membranes.

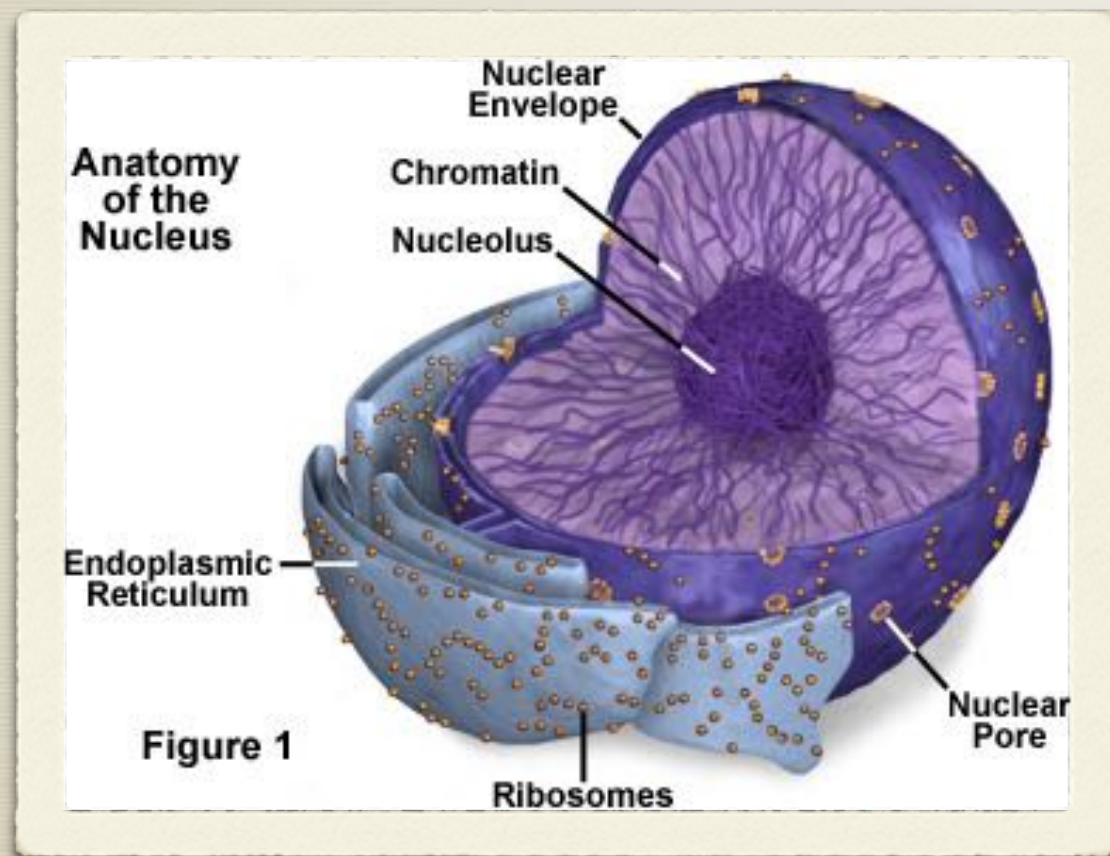
In cells with cell walls, the cell membrane is located just inside the cell wall. The cell membrane controls what substances come into and out of a cell.



The Nucleus

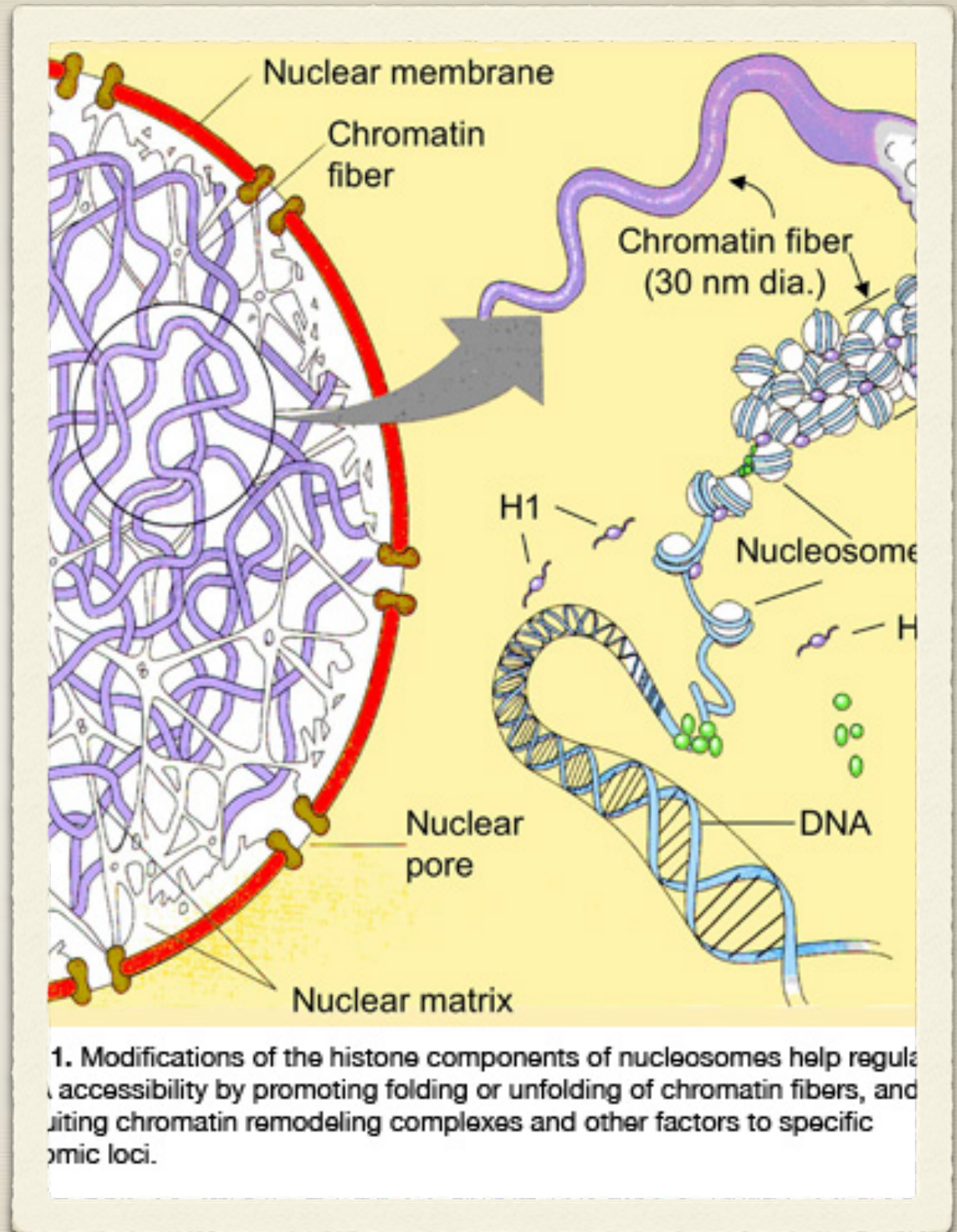
The **nucleus** is a large, oval structure that acts as the “brain” of the cell. You can think of the nucleus as the cell's control center, directing all of the cell activities.

The nucleus is surrounded by a protective membrane called the nuclear envelope. Materials pass in and out of the nucleus through small openings, or pores, in the nucleus.



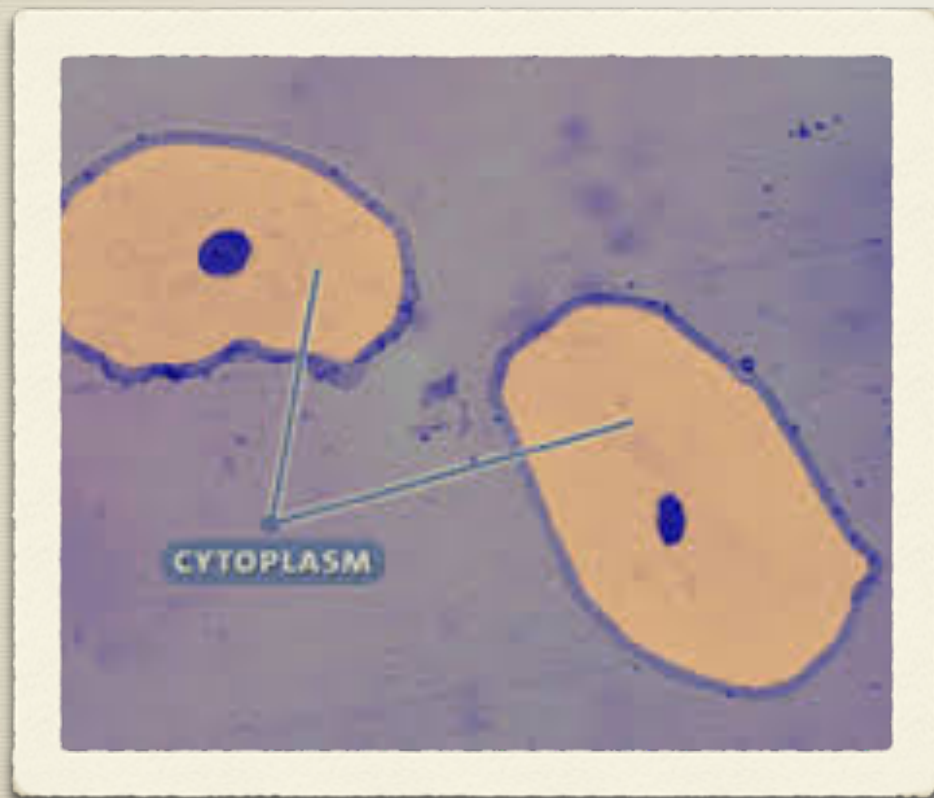
The nucleus “knows” how to direct the cell using small strands floating inside the nucleus called **chromatin**. These strands contain genetic material, instructions for directing the cell.

There is a structure in the nucleus, the nucleolus, which is where ribosomes are made. **Ribosomes** are the organelles where proteins are produced.



Organelles in the Cytoplasm

The **cytoplasm** is the region between the cell membrane and the nucleus. Many cell organelles are found in the cytoplasm. The cytoplasm is a clear, thick, gel-like fluid. This fluid is constantly moving.



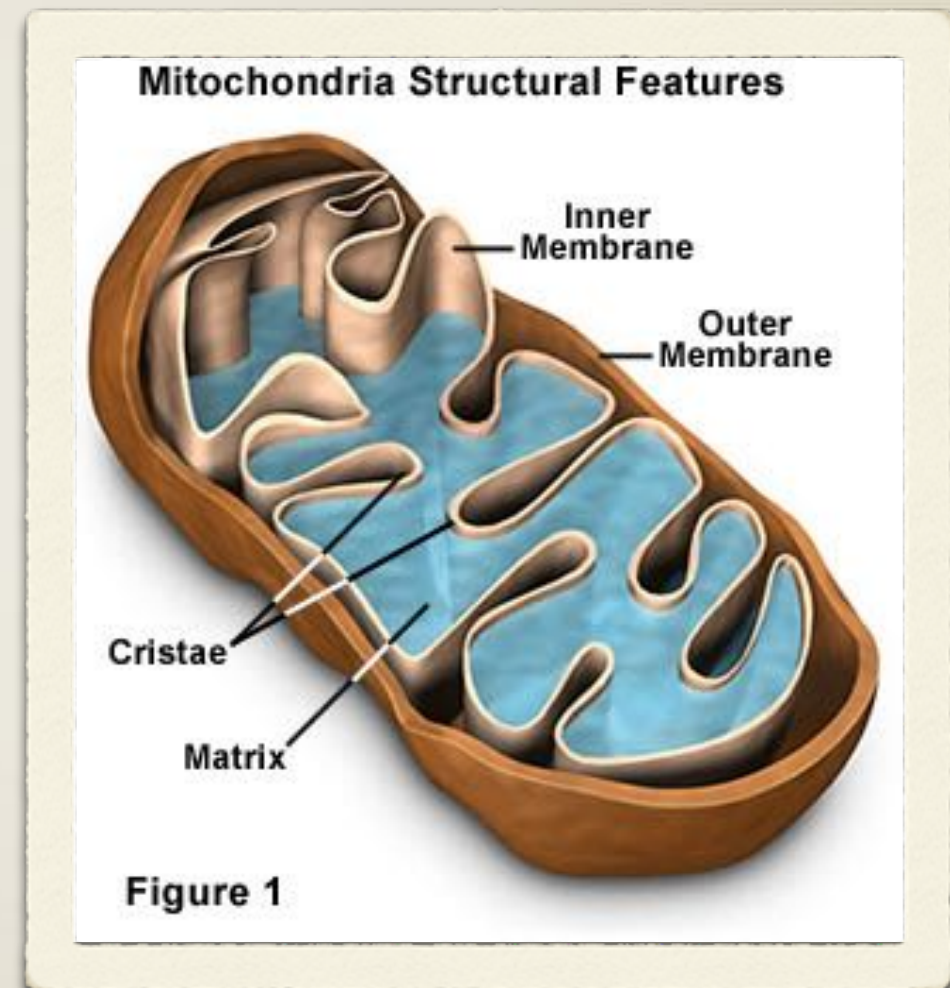
Cytoplasm is responsible for giving a cell its shape. It helps to fill out the cell and keeps organelles in their place. Without cytoplasm, the cell would be deflated and materials would not be able to pass easily from one organelle to another.

Cytosol is the part of the cytoplasm that does not contain organelles. Instead, cytosol is confined by the boundaries of a matrix which fills the part of the cell that does not contain organelles.

Mitochondria

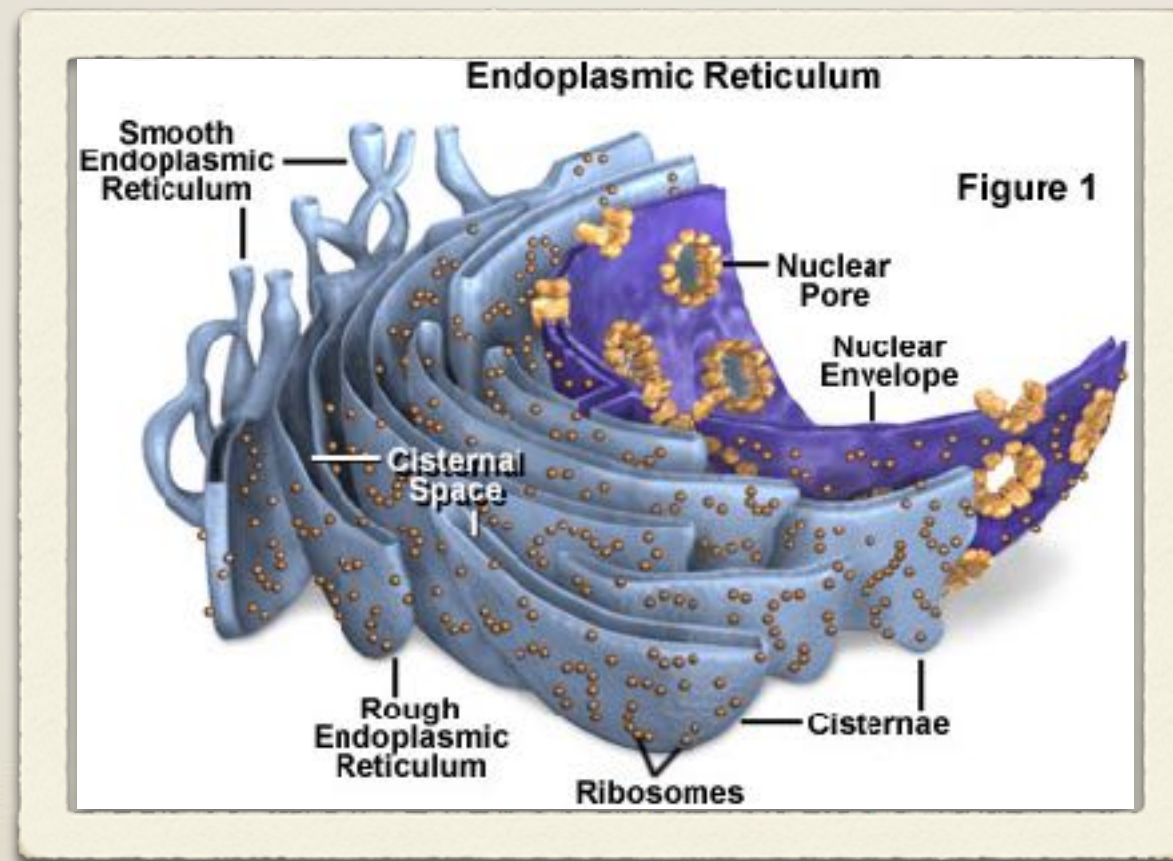
The **mitochondria** are known as the “powerhouses” of the cell because they convert energy in food molecules to energy the cell can use to carry out its functions.

Each cell contains a different number of mitochondria. The number present is dependent upon how much energy the cell requires. The more energy a cell needs the more mitochondria that will be present. Cells have the ability to produce more mitochondria as needed. They also can combine mitochondria to make larger ones.



Endoplasmic Reticulum

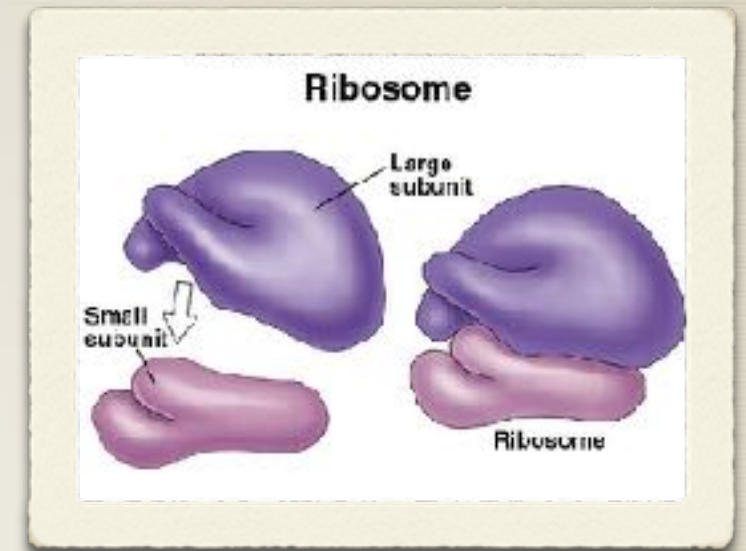
Maze-like passageways called the **endoplasmic reticulum** carry proteins and other materials from one part of a cell to another.



Endoplasmic reticulum has two types, rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER). Rough ER is studded with ribosomes and important in protein synthesis. Smooth ER doesn't have ribosomes and is very important to the process of metabolism.

Ribosomes

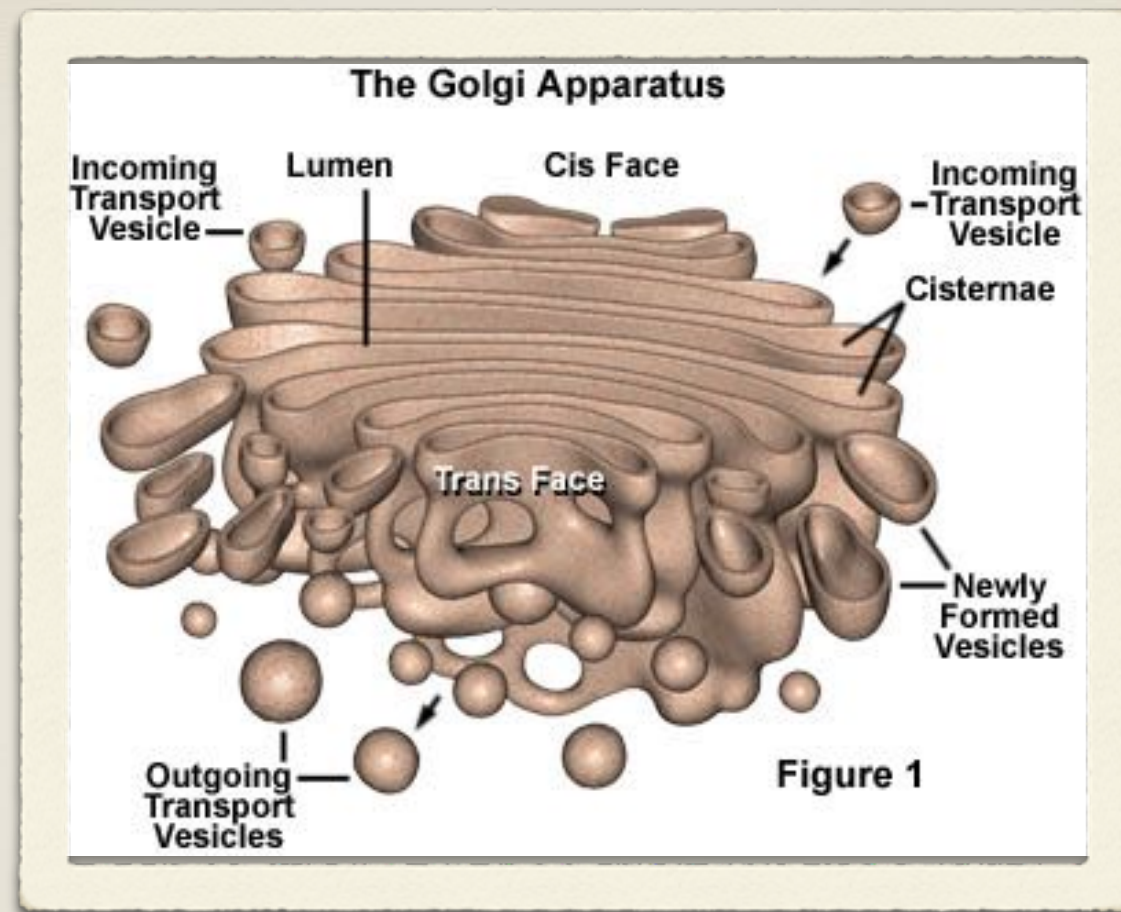
Attached to some surfaces of the **endoplasmic reticulum** are small, grain-like bodies called ribosomes. Other ribosomes float in the cytoplasm. Ribosomes function as factories to produce proteins.



The location of the ribosomes in a cell determines what kind of protein it makes. If the ribosomes are floating freely throughout the cell, it will make proteins that will be utilized within the cell itself. Proteins made on the rough ER are used for usage inside the cell or outside the cell.



Golgi Bodies



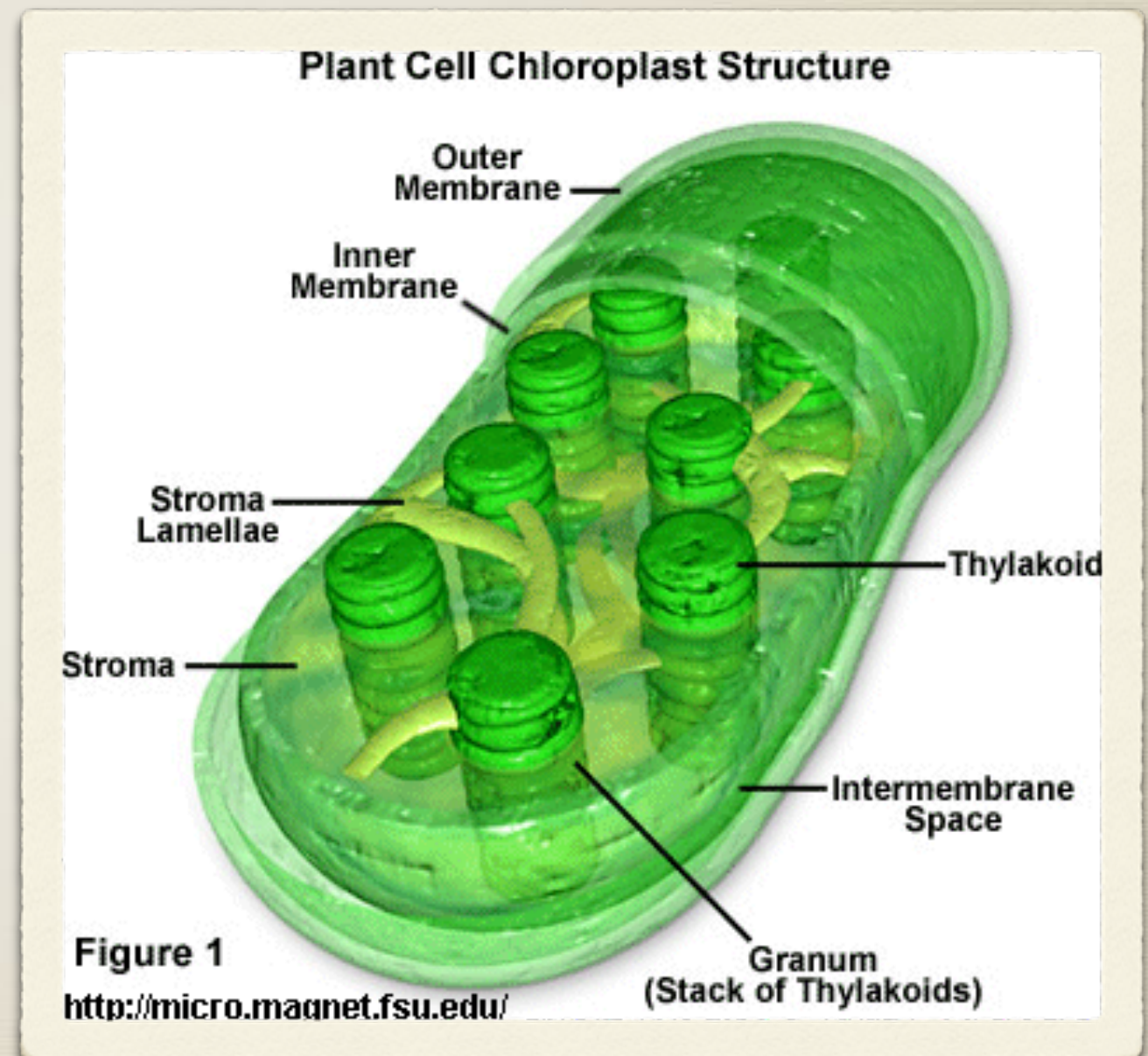
Collections of sacs and tubes called **golgi bodies** receive proteins and other newly formed materials from the endoplasmic reticulum, package them, and distribute them to other parts of the cell. They also release materials outside of the cell.

Also referred to as the Golgi apparatus or the Golgi complex, it's part of the cell's endomembrane system.

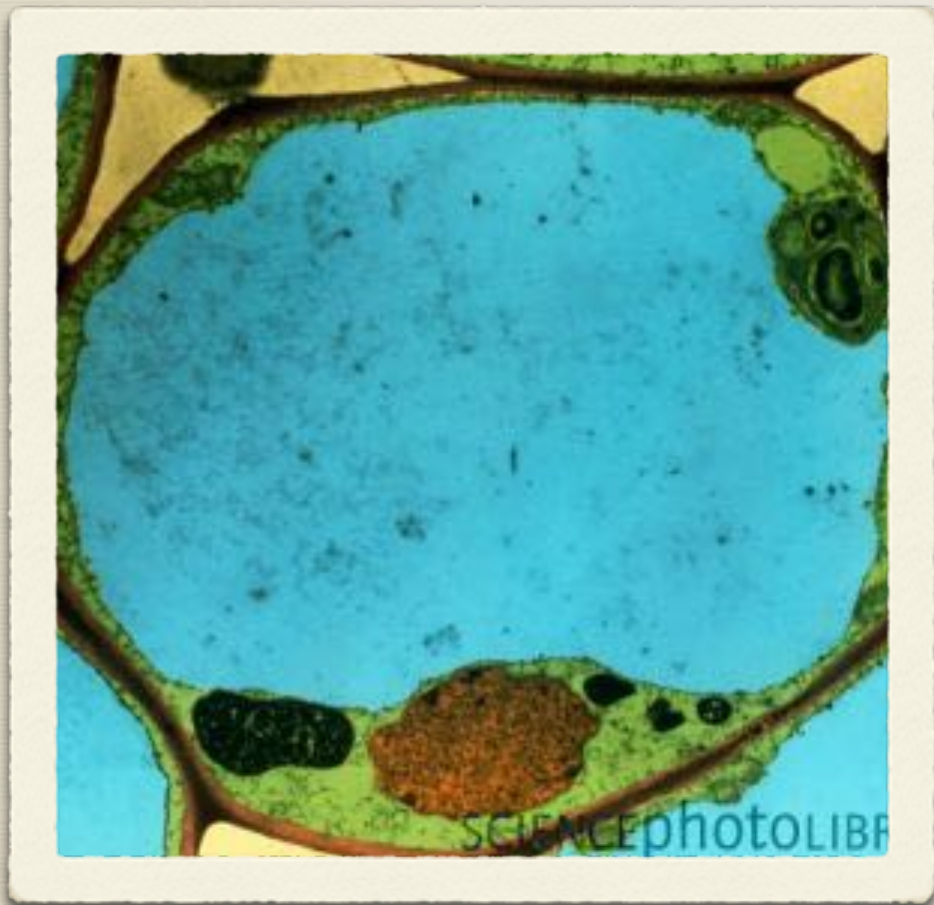
Chloroplasts

In plants and some other organisms, large, green structures called **chloroplasts** capture energy from sunlight and use it to produce food for the cell.

Plant cells also contain chlorophyll. **Chlorophyll** gives plants their green color and allows them to perform photosynthesis. Photosynthesis is the process plants use to make their own food by using carbon dioxide, water, and sunlight.



Vacuoles



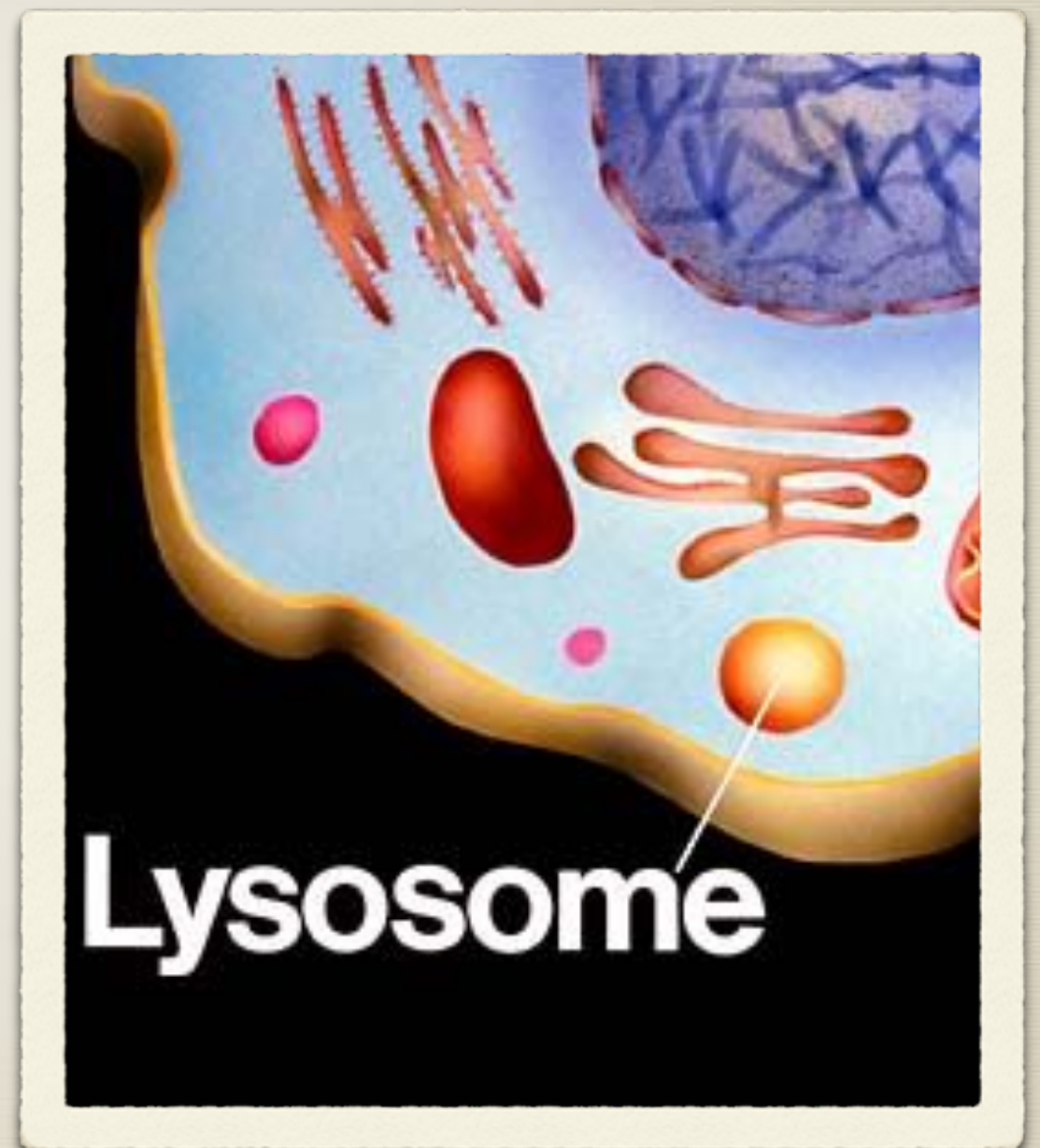
Large water-filled sacs called **vacuoles** float in the cytoplasm. Some animal cells do not have vacuoles while other do. Vacuoles can also store waste products.

Vacuoles can serve a wide variety of functions in a cell, and their importance depends on what role they play within the cell. Typically, their job includes isolating harmful materials, storing waste products, storing valuable water in a plant cell, helping maintain the pressure within a cell, balancing the pH of a cell, exporting products out of the cell, and storing proteins for seed germination.

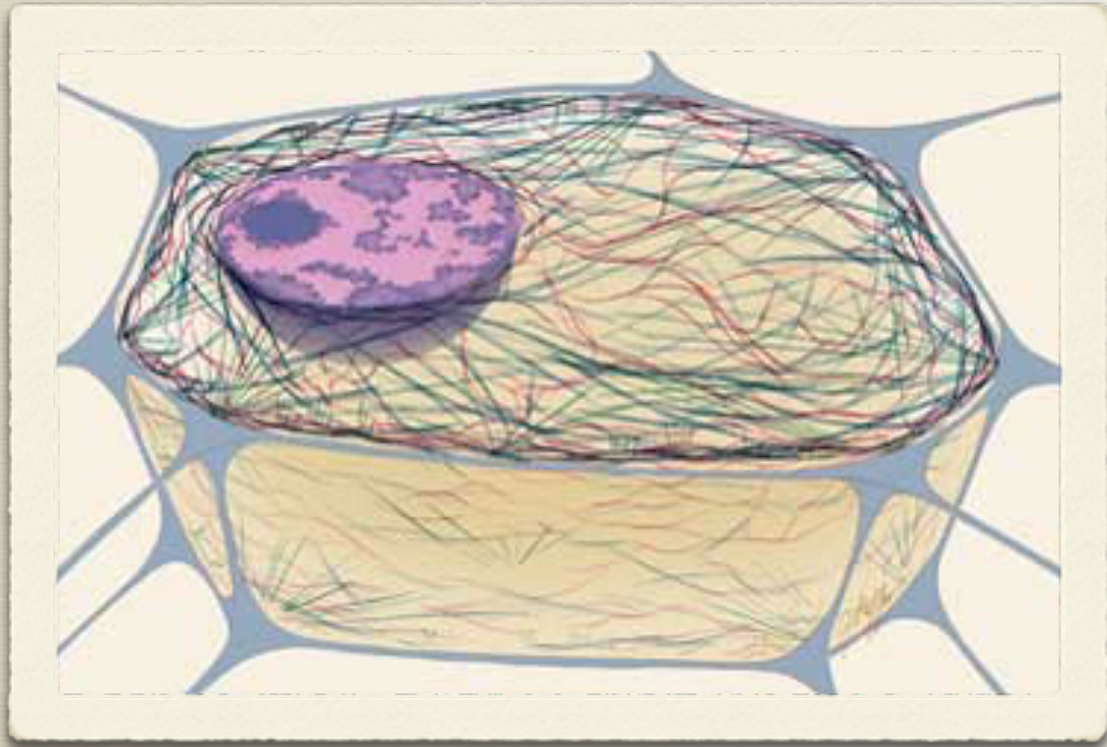
Lysosomes

Small, round structures called **lysosomes** contain chemicals that breakdown certain materials in the cell. Some chemicals breakdown large food particles into smaller ones. Lysosomes can also break down old cell parts and release the substances so they can be used again.

Lysosomes are also in charge of cellular homeostasis, cell membrane repair, cell signaling, and energy metabolism. These are actively related to maintaining health and fighting diseases in their host organisms. Depending on the job they'll do in the cell, lysosomes can vary greatly in size. The largest lysosomes can be as much as ten times larger than the smallest ones.



Other Organelles



Microtubules are hollow, fibrous shafts whose main function is to help support and give shape to the cell. They also serve a transportation function, as they are the routes upon which organelles move through the cell. They are most often found in all eukaryotic cells and, together with the microfilaments and intermediate filaments, form the cytoskeleton.

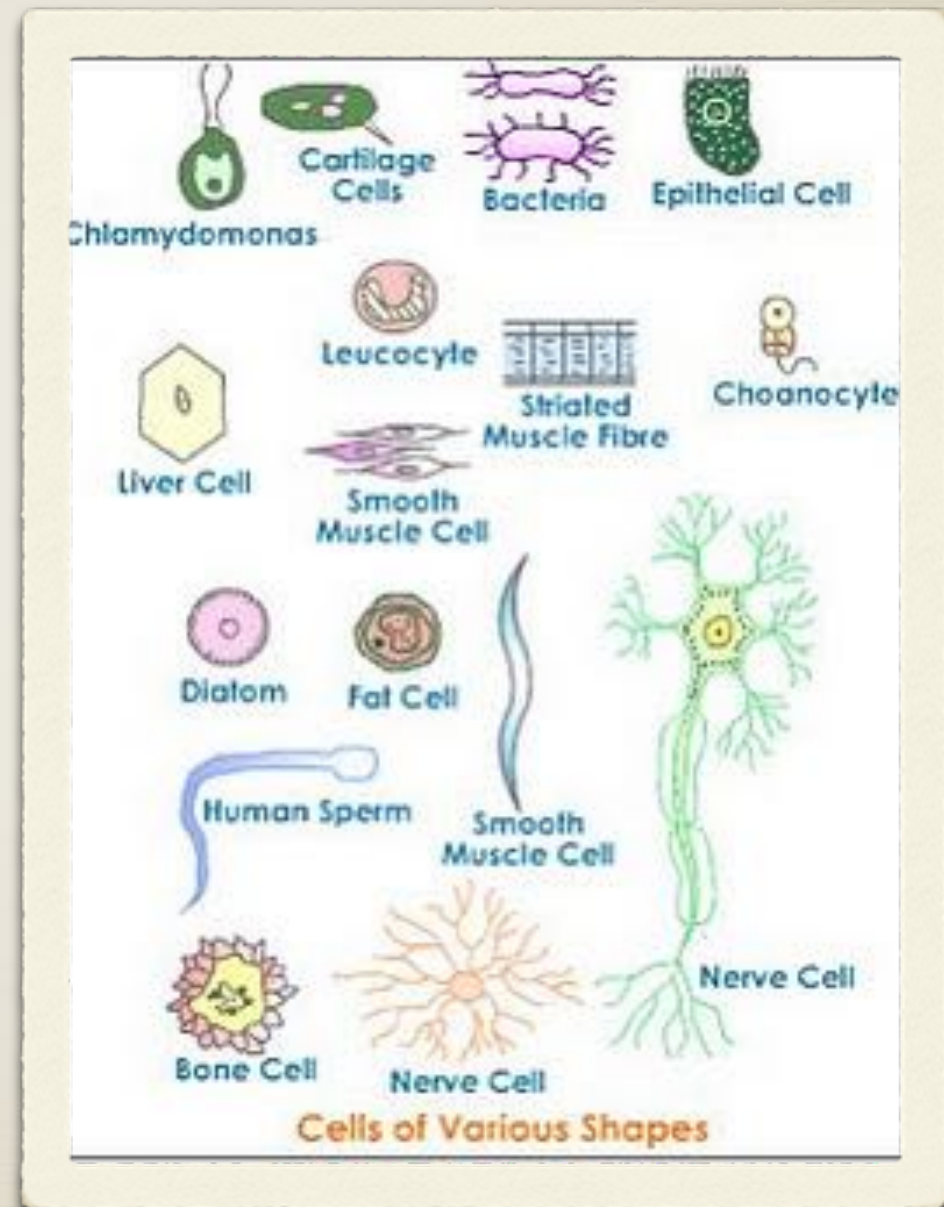
Microfilaments are the thinnest filaments of the cytoskeleton and are found in the cytoplasm of eukaryotic cells. They are flexible but still strong, resisting crushing and buckling while providing support to the cell.

Microfilaments are very versatile cell components that serve a role in cell division, movement, and changes in cell shape. The strong but flexible arrangement of the microfilaments' framework allows it to help with cell movement.

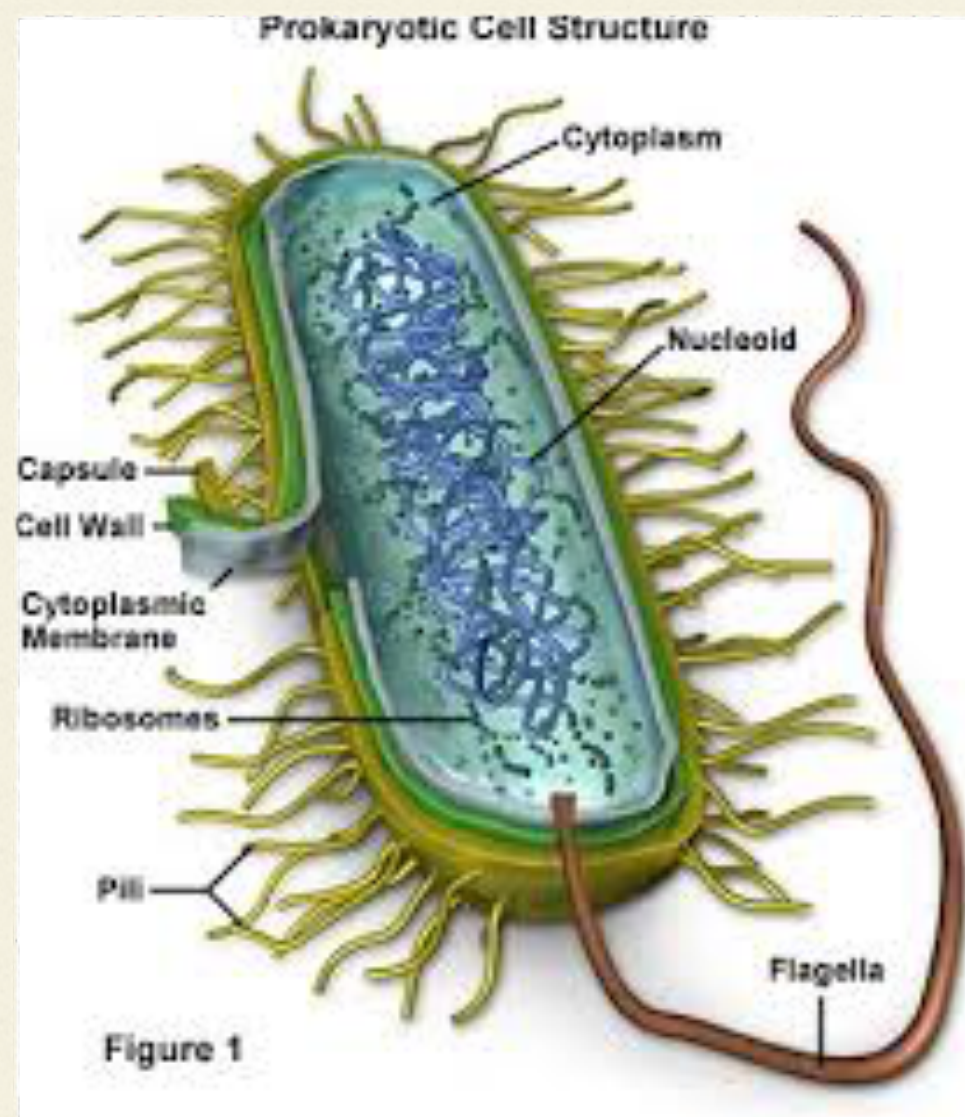
Specialized Cells

Plants and animals contain many cells. In a many celled organism, the cells are often quite different from each other and are specialized to perform specific functions. In many celled organisms, cells are often organized into tissues, organs, and organ systems.

A tissue is a group of similar cells that work together to perform a specific function. An organ is made up of different kinds of tissues that functions together. An organ system is a group of organs that work together to perform a major function.



Bacterial Cell



Bacterial cells are smaller and different from plant and animal cells. While a bacterial cell does have a cell wall and a cell membrane, it does not contain a nucleus.

The bacterial cell's genetic material, which looks like thick, tangled string, is found in the cytoplasm. Bacterial cells contain ribosomes, but none of the other organelles found in plant and animal cells.

Keywords: English - Spanish

Cells - Células

Cell Wall - Pared Celular

Cell Membrane - Membrana Celular

Nucleus - Núcleo

Chromatin - Cromatina

Ribosomes - Los Ribosomas

Cytoplasm - Citoplasma

Endoplasmic Reticulum - Retículo endoplásmico

Keywords Continued

Mitochondria - Las mitocondrias

Golgi Bodies - Cuerpos de Golgi

Chloroplasts - Los Cloroplastos

Vacuoles - Vacuolas

Lysosomes - Los Lisosomas

Bacterial Cells - Las Células Bacterianas